APPENDIX J

AIR QUALITY REGULATIONS

The basic framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act and its amendments, and the 1999 Regional Haze Regulations. The Clean Air Act addresses criteria air pollutants, State and national ambient air quality standards for criteria air pollutants and the Prevention of Significant Deterioration program. The Regional Haze Regulations address visibility impairment.

J.1 POLLUTANTS

Air pollutants addressed in this study include criteria pollutants, hazardous air pollutants (HAP) and sulfur and nitrogen compounds, which could cause visibility impairment or acid rain.

CRITERIA POLLUTANTS

Criteria pollutants are those for which national standards of concentration have been established. Pollutant concentrations greater than these standards represent a risk to human health. Criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone (O_3), particulate matter (PM_{10}, $PM_{2.5}$), and lead (Pb).

Carbon Monoxide

CO is an odorless, colorless gas formed during any combustion process, such as operation of engines, fireplaces, and furnaces. High concentrations of CO affect the oxygen-carrying capacity of the blood and can lead to unconsciousness and asphyxiation. Wildfires are natural sources of CO.

Nitrogen and Sulfur Compounds

NO_2 is a red-brown gas formed during operation of internal combustion engines. Such engines emit a mixture of nitrogen gases, collectively called nitrogen oxides (NO_x). NO_2 can contribute to brown cloud conditions, and can convert to ammonium nitrate particles and nitric acid, which can cause visibility impairment and acid rain. Bacterial action in soil can be a natural source of nitrogen compounds.

SO_2 forms during combustion from trace levels of sulfur in coal or diesel fuel. It can convert to ammonium sulfate ($(NH_4)_2SO_4$) and sulfuric acid (H_2SO_4), which can cause visibility impairment and acid rain. Volcanoes are natural sources of SO_2. Anthropogenic sources include refineries and power plants.

Sulfur and nitrogen compounds that can be deposited on terrestrial and aquatic ecosystems include nitric acid (HNO_3), nitrate (NO_3^-), ammonium (NH_4^+), and sulfate (SO_4^{--}). Nitric acid (HNO_3), and nitrate (NO_3^-) are not emitted directly into the air, but

form in the atmosphere from industrial and automotive emissions of nitrogen oxides (NO_x). Sulfate (SO_4^{--}) is formed in the atmosphere from industrial emission of sulfur dioxide (SO_2). Deposition of HNO_3, NO_3^- and SO_4^{--} can adversely affect plant growth, soil chemistry, lichens, aquatic environments, and petroglyphs. Ammonium (NH_4^+) is associated with feedlots and agricultural fertilization. Deposition of NH_4^+ can affect terrestrial and aquatic vegetation. While deposition may be beneficial as a fertilizer, it can adversely affect the timing of plant growth and dormancy.

Ozone

O_3 is a faint blue gas that is generally not emitted directly into the atmosphere, but is formed from NO_x and volatile organic compound (VOC) emissions. As stated above, internal combustion engines are the main source of NO_x. Volatile organic compounds, like terpenes, are very reactive. Sources of VOC include, but are not limited to, paint, varnish and some types of vegetation. The faint acrid smell common after thunderstorms is due to ozone formation by lightning. O_3 is a strong oxidizing chemical that can burn lungs and eyes, and damage plants.

Particulate Matter

Particulate matter (e.g., soil particles, hair, pollen, etc.) is essentially small particles suspended in the air that settle to the ground slowly and may be re-suspended if disturbed. Separate allowable concentration levels for particulate matter are based on the relative size of the particle:

- PM_{10}, particles with diameters less than 10 micrometers, are small enough to be inhaled and can cause adverse health effects.
- $PM_{2.5}$, particles with diameters less than 2.5 micrometers, are so small that they can be drawn deeply into the lungs and cause serious health problems. Particles in this size range are also the main cause of visibility impairment.

Lead

Before the wide use of unleaded fuel for automobiles, lead particles were emitted from tailpipes. The lead standard will not be addressed in this MSA because proposed projects will have no lead emission sources.

HAZARDOUS AIR POLLUTANTS

There are a wide variety of hazardous air pollutants (HAPs) including N-hexane, ethylbenzene, toluene, xylene, formaldehyde, and benzene. Although HAPs do not have Federal standards, they may have "significance thresholds" established by some states and are typically evaluated for potential chronic inhalation and cancer risks.

Hazardous air pollutant emissions are associated with industrial activities, such as oil and gas operations, refineries, paint shops, dry cleaning facilities, and wood working shops. For example, the Rawlins BLM Field Office produces the large signs marking the

entrances to BLM-managed lands. The Wyoming Department of Environmental Quality has determined that the emissions from the sign shop are insignificant in emission rate and ambient air quality impact (Olson 2002).

J.2. WYOMING AND NATIONAL AMBIENT AIR QUALITY STANDARDS

Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS) set the absolute upper limits for criteria air pollutant concentrations at all locations to which the public has access. The WAAQS and NAAQS are legally enforceable standards. Concentrations above the WAAQS and NAAQS represent a risk to human health. State standards must be equally or more strict than Federal standards.

The EPA has developed standards for each criteria pollutant for a specific averaging time (Table J-1). Short averaging times (1, 3, and 24 hours) address short-term exposure while the annual standards address long-term exposure. Longer-term standards are set to lower allowable concentrations than are short-term standards to recognize the cumulative effects of long-term exposure.

J.3. PREVENTION OF SIGNIFICANT DETERIORATION

The goal of the Prevention of Significant Deterioration (PSD) program is to ensure that air quality in areas with clean air does not significantly deteriorate, while maintaining a margin for future industrial growth. Under PSD, each area in the United States is classified by the air quality in that region according to the following system:

- PSD Class I Areas: Areas with pristine air quality, such as wilderness areas, national parks and Indian reservations, are accorded the strictest protection. Only very small incremental increases in concentration are allowed in order to maintain the very clean air quality in these areas.
- PSD Class II Areas: Essentially, all areas that are not designated Class I are designated Class II. Moderate incremental increases in concentration are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and Federal standards (WAAQS and NAAQS).
- PSD Class III Areas: No areas have yet been designated Class III. Concentrations would be allowed to increase all the way up to the WAAQS and NAAQS.

The incremental increases allowed for specific pollutants in Class I and Class II areas are provided in Table J-2.

Comparisons of potential NO_2 and SO_2 concentrations with PSD increments are intended only to evaluate a threshold of concern and do not represent a regulatory PSD Increment Consumption analysis. Regulatory PSD Increment Consumption analyses are solely the responsibility of the State of Wyoming, which has been granted primacy under the Clean Air Act.

J.4. REGIONAL HAZE REGULATIONS

Visibility impairment in the form of regional haze obscures the clarity, color, texture and form of what we see. Haze-causing pollutants (mostly fine particles) are directly emitted to the atmosphere or are formed when gases emitted to the air form particles as they are carried downwind. Emissions from human-caused and natural sources can be carried great distances contributing to regional haze.

Visual range, one of several ways to express visibility, is the furthest distance a person can distinguish a dark landscape feature from a light background like the sky. Without human-caused visibility impairment, natural visual range is estimated to average about 150 miles in the western United States and about 70 miles in the eastern United States.

The Regional Haze Regulations were developed by the EPA in response to the Clean Air Act Amendments of 1990. They are intended to maintain visibility on the least impaired days and improve visibility on the most impaired days in mandatory Federal Class I areas across the United States, so that visibility in these areas is returned to natural conditions by the year 2064. These regulations require states to submit a regional haze State Implementation Plan (SIP) and progress reports to demonstrate reasonable progress toward the 2064 goal.

Table J-1. National and Wyoming Ambient Air Quality Standards.

Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)
Carbon Monoxide—CO	1 hour	40,000	40,000
	8 hour	10,000	10,000
Nitrogen Dioxide—NO_2	Annual	100	100
Sulfur Dioxide—SO_2	3 hour	1300	695
	24 hour	365	260
	Annual	80	60
Ozone—O_3	1 hour	235	235
	8 hour	157	157
Particulate Matter—PM10	24 hour	150	150
	Annual	50	50
Fine Particulate Matter—PM2.5	24 hour	65	65
	Annual	15	15

Table J-2. PSD Increments.

Pollutant	Averaging Time	PSD Increment ($\mu g/m^3$)	
		Class I	Class II
Nitrogen Dioxide—NO_2	**Annual**	2.5	25
Sulfur Dioxide—SO_2	3 hour	25	512
	24 hour	5	91
	Annual	2	20
Particulate Matter—PM_{10}	24 hour	8	30
	Annual	4	17